Department of Finance Canada | Ministère des Finances Canada

MEMORANDUM NOTE DE SERVICE

Memo to Deputy Minister

DMO ..... Orig. + 4
Assoc. DM & G7 Deputy 1
Associate DM 1
EFP ..... e-copy
C&C ..... e-copy
LAW ..... e-copy

TO / À: Paul Rochon

FROM / DE: Nick Leswick

Security classification / Classification de sécurité: SECRET

Originator/Telephone number / Auteur/Numéro de téléphone: Carlos Rosell

Our file / Notre référence:

Your file / Votre référence: 2018FIN468187

Date: FEB 06 2018

SUBJECT / OBJET: **Releasing estimates of the impact of the now defunct Hiring Credit for Small Business measure**

For Action. Your decision is **required by February 2** in order to release to the EI Commissioner for Employers a study on the impact of the Hiring Credit for Small Business.

This memo seeks your approval to make the attached paper available to the EI Commissioner for Employers by February 2. The EI Commissioner plans to use this work for its upcoming EI Monitoring and Assessment Report (MAR) expected to be published this May. The MAR will only refer to some of the results in the paper but the whole study will be made available upon request.

The MAR is an annual publication that provides an analysis of the overall effectiveness of the EI program in the previous fiscal year. As part of its ongoing assessment and evaluation process, each year the Canada EI Commission selects topics for inclusion in the Report as supplemental studies.

In 2016 the EI Commissioner for Employers requested an analysis of the employment impacts of the EI Hiring Credit for Small Business (HCSB; 2011-13) to be added to its 2016-17 Report, which is expected to be published this May.

Attached is the current draft of the paper. Overall the results suggest that the EI Hiring credit was not effective in raising employment (its targeted objective) or improving firm performance in other dimensions. The only potential positive effect is that it helped the employment of unincorporated started-ups.

ADM: Nick Leswick (613-369-3346)
Director: Claude Lavoie (613-369-5647)

s.21(1)(b)

Canada

[redacted]

Decision

Release the paper to the EI Commissioner for Employers.

(a) I approve _____

(b) I do not approve _____

Background

Budget 2011 introduced the HCSB on a one-year temporary basis. Budgets 2012 subsequently extended the credit while Budget 2013 also expanded it. The credit was intended to promote job creation by reducing the employer EI premiums of small firms. Under the HCSB, eligible firms automatically received up to a $1,000 to offset any year-over-year increase in the EI premiums they paid. Annually, on average about $220 million was paid to about 550,000 businesses. This meant benefitting firms each received about $400 in credits or about 0.6 per cent of their combined total payrolls and employer EI premiums. The funds to cover the costs of the HCSB were charged to the EI Operating Account.

The impact of the HCSB are estimated with firm-level regressions using data from Statistic Canada's National Accounts Longitudinal Microdata File. The empirical methods attempt to infer the causal impacts that the credit had on firm: employment, payrolls, productivity, revenues, investment, and research and development spending. As well, the analysis separately assesses the credit's impact on pre-existing (i.e. incumbent) and new firms (i.e. entrants /start-ups). Overall, the estimated impacts are either not statistically different from zero or negative. The only exceptions are with respect to unincorporated entrants. In this respect, the analysis suggests the HCSB only increased the employment and payrolls of unincorporated businesses that started-up once the credit was introduced. [redacted]

Assessing the Hiring Credit for Small Business

1.0 Introduction

The 2011 federal budget introduced the Hiring Credit for Small Business (HCSB). This measure was meant to stimulate job creation and growth among small businesses by limiting increases in employer insurance (EI) premiums. Specifically, the credit allowed eligible employers in 2011 to offset all or part of any increase in premiums over the previous year. The maximum offset was $1,000. To qualify for the credit, employer EI premiums in 2010 needed to be $10,000 or less. As a result, the credit mostly targeted companies that were smaller in terms of their workforce or the amount of insurable earnings they paid. However, the credit also helped larger companies if, for example, they started up in 2011.[1] Finally, the Canada Revenue Agency (CRA) applied the credit automatically when businesses filed their taxes. As a result, qualifying businesses did not need to apply for the credit.

The HCSB was intended to be a temporary one-year measure but in subsequent years, it was extended and expanded. Budget 2012 announced the HCSB would be continued an additional year under the same parameters as in 2011.[2] Budget 2013 was the last budget to include the HCSB. However, in this year, the HCSB was expanded. To qualify, employers needed to have paid no more than $15,000 in EI premiums in 2012 rather than $10,000 as in previous years. Finally, the funds to cover the costs of the HCSB were charged to the EI operating Account.

Overall, not much is known about the effectiveness of the HCSB. Indeed, the credit was not contingent on additional hiring, growth or any type of performance improvement. Instead, it automatically offset any year-over-year increase in EI premiums for qualifying firms. This increase could have resulted from hiring additional employees or paying higher wages. However, the increase could have also resulted from legislated increases in the EI premium rate or an increase in maximum insurable earnings.

To help fill the evidence gap on the effectiveness of the HCSB, this paper uses Statistics Canada's business-level National Accounts Longitudinal Microdata File (NALMF). Specifically, the paper assesses if the credit helped improve the performance of qualifying firms. To this end, the analysis uses difference-in-difference (DD) regressions and regression discontinuity (RD) methods. As well, to help ensure the possible impacts of the HCSB are observed, the paper employs these methods to assess the possible impact on various margins of firm performance. For all businesses (i.e. incorporated or otherwise – e.g. non-profits, religious institutions, governments) the impact is assessed on employment and payrolls. However, given that more information is available for incorporated businesses, the impact of the credit on corporations is also assessed on productivity, revenues, investment and research and development (R&D) expenditures.

This paper segments the analysis to assess the credit's impact separately for businesses with employment in the previous years (i.e. incumbents) and for those without (i.e. entrants). This is in part

[1] This was because start-ups were considered to have: paid $0 in EI premiums in 2010 and fallen below the $10,000 qualification threshold.
[2] To qualify, employers needed to have paid no more than $10,000 in 2011 in EI premiums and the maximum credit earned was $1,000 to offset EI premium increases between 2011 and 2012.

out of necessity; the data needed to study entrants in the same way as incumbents are unavailable before market entry. As well, the analysis is segmented in case the HCSB's impact differs depending on the entry status of businesses.

Overall, the analytical work does not suggest the HCSB helped qualifying firms perform better. We do not find evidence that the credit had a positive performance impact for incumbent firms; incumbents did not experience a bump in employment, payrolls, productivity, revenues, investment, or R&D expenditures. As well, for the most part, entrants did not see improved performance either. Some results suggest unincorporated entrants may have grown in terms of employment and payrolls because of the credit. However, given the preponderance of evidence, this positive effect needs to be considered cautiously because false positives should be expected occasionally.

Though the overwhelming finding is that the HCSB was not successful in improving firm performance, there are some caveats to consider. First, for the most part, the specifications of the DD regressions are simple; some elements do not control for time-varying firm characteristics. As a result, missing-variable bias could obscure results. However, RD methods attenuate this worry because they confirm many of the DD results while not being susceptible to missing explanatory variables. Another consideration is that the credit's impact might have been diffused over multiple dimensions. For example, a business could have used the credit to increase employment. At the same time, a different business could have used the credit to invest or to increase R&D spending. As a result, the credit's impact could have been too diffused over different outcomes to be unobservable.

To assess the impact of the HCSB, the paper proceeds as follows. Section 2 reviews briefly the hiring credit literature to provide some context for the HCSB. Section 3 gives a brief overview of the data used for the analysis (i.e. the NALMF database). Section 4 outlines some main facts about the EI system and the credit. This includes estimating the total cost of the program, the number of business that were eligible and that actually benefited from the credit. The impact of the HCSB on incumbent businesses is assessed in Section 5. To give a robust assessment of the impacts, the paper uses two different methodologies: DD regressions in Section 5.1 and RD methods in Section 5.2. Section 6 determines if the credit helped the performance of entering firms. This section assesses if the HCSB induced more business to enter. As well, the section determines if entrants performed better because of the credit. The paper concludes in Section 7 by providing some caveats to the analysis and some broad policy implications.

2.0 Literature review

Hiring credit programs and other equivalent policies decreasing employer non-wage costs (e.g. payroll tax reductions, social contribution relief) are commonly used to encourage employment. This is especially true in the aftermath of the Great Recession. However, evidence of the effectiveness of these policies is inconclusive and outcomes seem to depend on whom these efforts are intended to help and how programs are administered. The following provides a short overview of the some of the existing literature.

Old papers in the literature on the effectiveness of hiring credits suggest credits are generally ineffective. However, as suggested by Neumark (2016), the poor performance observed could be because the programs that were studied narrowly targeted types of workers, often disadvantaged people. As a result, such credits could have gotten in their own way if employers interpret worker

elgibility as a signal of a worker's low productive or high risky. Indeed, using an experimental program of Targeted Job Tax Credits for welfare recipeints in Dayton Ohio, Burtless (1985) finds worse employment outcomes for workers more closely associated with the credits.

In contrast, recent work suggests hiring credits can encourage employment, at least under some conditions. Using variation in US state-level hiring credit programs over the period of the Great Recession and after, Neumark and Grijalva (2013) finds that most types of credit programs are ineffective. However, this paper finds some exceptions. Specifically, programs that target the unemployed, allowed governments to recapture benefits if job creation targets are unmet by employers, and programs offering refundable credits succeed in encouraging job creation.

Cahuc et al. (2017) also shows hiring credit programs can have positive employment effects. For this work, Cahuc et al. (2017) uses administrative data from the introduction of the Zéro *Charges* program in France in 2008. This program relieved small firms (i.e. those with less than 10 workers) from their social contributions on each new low-wage worker that was hired. This meant employers saved 12 per cent or 2,400 Euros annually of the labour cost of each new full-time hire that was paid the minimum wage. Relief declined to zero once workers were paid 1.6 times the minimum wage. Nevertheless, for workers paid 30 per cent above the minimum, employers were still able to save 4 per cent of labour costs of each new worker. Overall, Cahuc et al. (2017) finds that the Zéro *Charges* program increased employment for low-wage workers by 0.8 per cent.

Finally, Eurofound (2017) generally reviews the various studies assessing the impacts of hiring credits and equivalent policies that reduced non-wage labour costs throughout European Union countries since 2000. The main finding is that policies like hiring credit generally succeed in spurring hiring. However, it is still very common for such programs to be ineffective. For example, Eurofound (2017) finds that in about 40 per cent of case, programs reducing non-wage costs were found to be ineffective.

3.0 Data

To assess the impact of the HCSB, the analysis uses Statistics Canada's National Account Longitudinal Microdata File (NALMF). This resource contains information on the universe of incorporated and unincorporated businesses from 2000 to 2014. The NALMF includes data from various sources. For example, the Business Register provides firm information on industry affiliation, the province of residence, and country of control. The Statement of Remuneration Paid gives information on payrolls. The Payroll Deductions and Remittances provides a monthly approximation of firm employment. Finally, corporate tax files provide further information. Tax records give balance sheet and income statement information through the General Index of Financial Information (GIFI) that incorporated firms must file while other tax records provide information on investment and R&D expenditures.[3]

Much of the data contained in the NALMF are administrative in nature. Despite this, information can be missing or incorrect. Moreover, the NALMF does not collect information on employer EI premiums, a key variable in the analysis. However, for the purposes of this study, employer EI contributions are approximated from available insurable earnings data and historical statutory premium rates.

Finally, the NALMF's unit of analysis for this study is the 9-digit Canada Revenue Agency (CRA) business number. This level of disaggregation allows for firm-level analysis of the impact of the HCSB using DD

[3] R&D expenditures reflect tax credit claims filed under the Scientific Research and Experimental Development program.

regressions and RD methods. It also allows firm-level data to be aggregated to show broad trends within industries or regions, for example.

4.0 Background

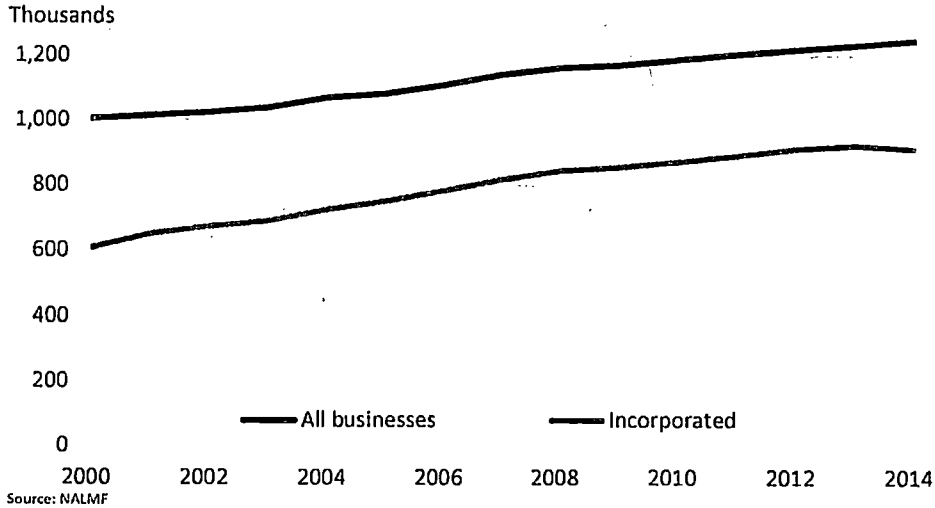
This section outlines the major long-run trends related to the EI system. It also focuses on specific details regarding the HSBC. Specifically, it estimates the total credits paid from 2011 to 2013 and how this was distributed across different types of businesses and across regions. This section also gives detail on the average magnitude of the credit received. It does so by comparing credit amounts relative to a business' total EI premiums as well as relative to the total sum of a business' EI premiums and total payroll.

The results in this section are based on businesses that both issued at least one T4 and that had positive payrolls. These firms are considered to be in operation because they show consistent signs of employment.[4] However, it is possible that some firms are excluded from the analysis because of missing data while others are included because data errors make them look as if they had employment. Consequently, the results presented here approximate actual values.

4.1 Long-run trends in the EI system

Figure 1 shows that the number of businesses with employment gradually increased over time. From 2000 to 2014, the number of all businesses in Canada increased at an average rate of 1.6 per cent. This increase was driven by incorporated businesses.[5] The number of these businesses increased at a higher rate, 2.9 per cent per year. As a result, incorporated businesses increased as a share of all businesses from 61 per cent in 2000 to 73 per cent by 2014.

Figure 1: Number of businesses, 2000-2014



Source: NALMF

Note: Author's cacluations based NALMF data. "All businesses" refers to incorporated and all other firms. Businesses considered are only those with positive annual T4s issues and positive payrolls.

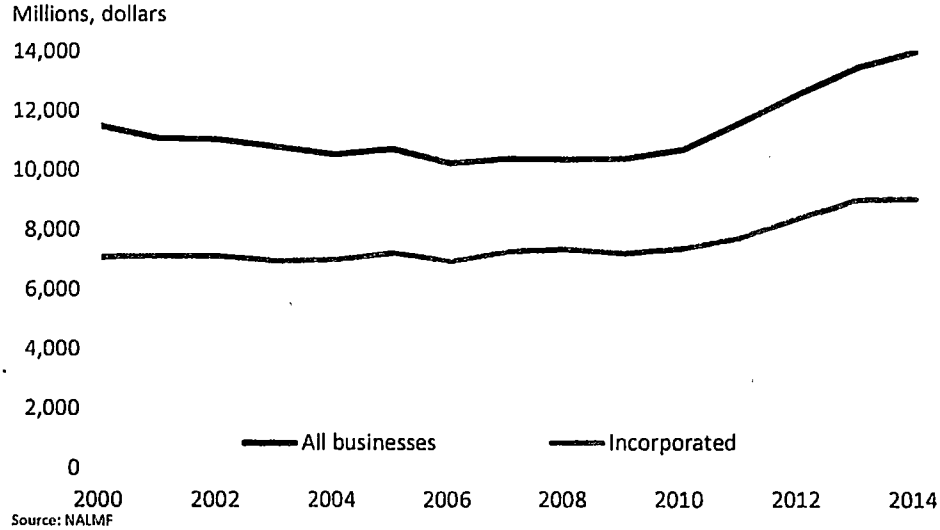
Total employer EI premiums increased in nominal terms from about $11.5 billion in 2000 to $14.0 billion in 2014 at an average rate of 1.4 per cent (Figure 2). As with the increase in the total number businesses,

[4] For the purposes of this paper, only businesses with employment are considered to be in operation even though some businesses can exist without employment. The specific variables that this study uses to determine if a firm employs workers differs somewhat between sections. Each section highlights this change.

[5] Each incorporated businesses reflects a distinct 9-digit CRA businesses number that filed a corporation income tax return in a given year.

EI premiums paid by incorporated firms increased more quickly than on aggregate. Premiums paid by incorporated businesses increased from about $7.1 to $9.0 billion at an average rate of 1.7 per cent.

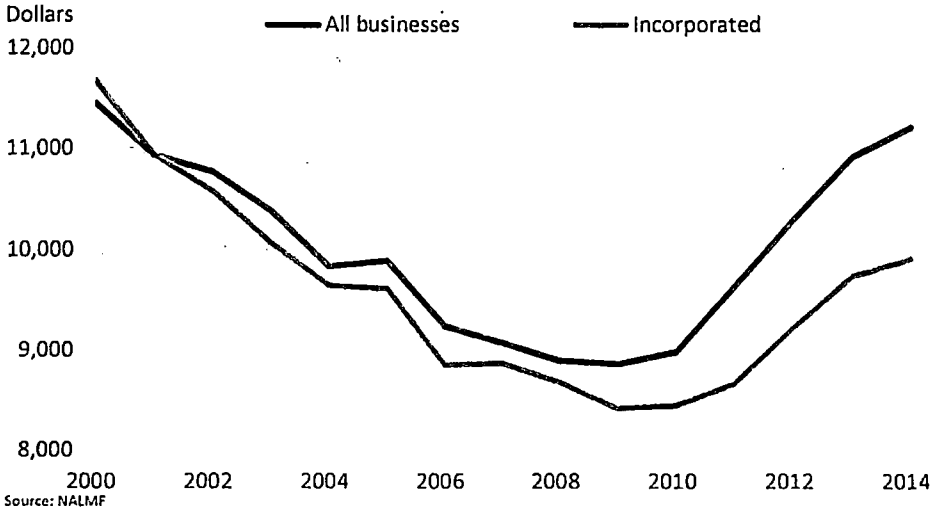
Figure 2: Total nominal employer EI premiums, 2000-2014



Source: NALMF
Note: Author's cacluations based NALMF data. "All businesses" refers to incorporated and all other firms. Businesses considered are only those with positive annual T4s issues and positive payrolls. Amounts are in nominal terms.

On average, in nominal terms, each business paid about $11,400 in EI premiums in 2000 (Figure 3). Moreover, incorporation status did not matter until 2008 when premiums began growing slower for incorporated businesses compared to all businesses on average. By 2014, the slower rise in premiums paid by incorporated firms left these businesses paying about $1,300 or 12 per cent less than the average firm.

Figure 3: Average nominal employer EI premiums paid per business, 2000-2014



Source: NALMF
Note: Author's cacluations based NALMF data. "All businesses" refers to incorporated and all other firms. Businesses considered are only those with positive annual T4s issues and positive payrolls. Amounts are in nominal terms.

4.2 The HCSB

4.2.1 General background

On average, nominal annual aggregate HCSB credit payments ranged between $212 to $235 million dollars or about 1.8 per cent of total employer EI premiums. Moreover, Table 1 shows that just over 90 per cent of all active businesses each year between 2011 and 2013 qualified for the HCSB.[6] However, just under half of all qualifying businesses received a positive credit amount. Mechanically, this is because these firms did not see year-over-year increases in the EI premiums they paid. Finally, each firm that received a credit earned on average about $400 over the three years. To give some perspective, this credit amount equalled about a third of each employer's EI premiums but less than one percent of total employer EI premiums and payrolls.

Table 1: Aggregate HCSB details

	2011	2012	2013
Employer premiums ($1,000,000)	11,600	12,568	13,439
Total credit amount paid ($1,000,000)	212	219	235
Number of sample businesses			
Total, all businesses	1,203,481	1,219,698	1,230,732
Qualifying for HCSB	1,103,214	1,111,904	1,149,870
Receiving HCSB credit	548,470	547,692	559,687
Average credit amount received per benefiting business ($)	387	400	420
Average subsidy rate relative (per cent)			
Employer EI premiums	34.3	33.9	32.2
Labour costs (i.e. payroll + employer EI premiums)	0.6	0.7	0.6

Source: NALMF Note: Author's calculations based NALMF data. Businesses considered are only those with positive annual T4s issues and positive payrolls. Dollar amounts are in nominal terms.

4.2.2 Firm employment size

The credit successfully targeted businesses that employed fewer workers. Panel A of Table 2 illustrates the distribution of qualifying and benefiting firms as well the distribution of HCSB payments over different firm-employment size categories.[7] More than 85 per cent of qualifying and benefitting firms employed fewer than 10 people. However, at most only about 80 per cent of the aggregate annual credit was paid out to these smaller firms. This was because, despite their greater number, smaller firms received on average a lower credit amount. For example, Panel B of Table 2 shows that in 2013 the average credit paid to each firm increased from about $372 for firms with less than 10 workers to $1,000 for firms with 500 or more workers. Finally, the relative magnitude of the subsidy declined with firm size. For example, as a share of employer EI payments and payrolls, the credit decreased from 0.6 per cent for businesses with less than 10 workers to 0.002 per cent for large businesses that employed at least 500 workers.

[6] The high share of qualifying businesses reflects that the vast majority of all businesses are small.

[7] This study uses the average monthly employment inferred from PD7s to approximate employment within each business. This is the most accurate employment measure available in the NALMF. Each month, businesses remit to the Canada Revenue Agency their statement of account for current source deductions, a PD7 form. This statement provides information on the paid workers a business employs, allowing business employment to be inferred.

Table 2: Distribution of the HCSB by business size (employment)

A: Distribution of HCSB benefits (per cent)

	Qualifying businesses			Benefitting businesses			Aggregate HCSB payment		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Number of workers									
Less than 10	92.9	93.3	91.0	89.0	89.4	86.1	80.1	81.1	75.6
10 to 49	7.0	6.6	8.9	10.9	10.5	13.7	19.5	18.5	23.8
50 to 99	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.5
100+	0.03	0.03	0.03	0.04	0.04	0.05	0.1	0.1	0.1
Total	100	100	100	100	100	100	100	100	100

B: HCSB subsidy amount by business size

	Average credit amount ($)			Credit as share of employer EI premiums (per cent)			Credit as share of employer EI premiums and payrolls (per cent)		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Number of workers									
Less than 10	351	365	372	70.7	69.8	69.6	0.6	0.6	0.6
10 to 49	699	710	735	34.8	34.3	33.5	0.2	0.2	0.2
50 to 99	930	921	903	10.5	10.5	8.9	0.1	0.1	0.1
100 to 499	947	949	943	5.5	5.6	5.1	0.04	0.05	0.06
500+	904	944	1000	2.7	3.3	3.4	0.03	0.01	0.002

Source: NALMF Note: Author's calculations based NALMF data. Businesses considered are only those with positive annual T4s issues and positive payrolls. Dollar amounts are in nominal terms. Panel A combines the 100-499 and 500+ worker categories into a 100+ category because of Statistics Canada disclosure restrictions to protect corporate confidentiality.

4.2.3 Firm age

Though the HCSB successfully targeted small businesses, it did not mean qualifying firms were also young. Panel A of Table 3 shows that more than 60 per cent of qualifying businesses were at least 5 years old. This emphasis on older firms largely reflects the age distribution of businesses more broadly in the economy; the distribution of qualifying firms in Panel A is very similar to that of the universe of all businesses. However, in relative terms, the distribution of aggregate HCSB payments favoured younger businesses. For example, in 2013 business younger than 3 years of age received about 28.9 per cent of all HCSB credit payments even though they represented only 18.2 per cent of all businesses. Small businesses received relatively more of all HCSB payments because they each received on average a greater credit amount. For example, in 2013, Panel B shows firms that were 1 or 2 years old, got on average $527 compared to businesses that were at least 5 years old and got $387. Finally, the subsidy rate that the credit offered was small. As a share of combined employer EI premiums and payrolls, the credit was no higher than 2 per cent for any firm of any age. Moreover, this rate declined with firm age.

Table 3: Distribution of the HCSB by business age

	A: Distribution of businesses (per cent)								
	HCSB qualifying businesses			Universe of businesses			Aggregate HCSB payment		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Age of business									
0	5.8	5.8	5.5	5.3	5.3	5.2	10.3	10.3	9.6
1-2	14.2	14.3	13.7	13.3	13.3	13.0	20.7	20.6	19.3
3-5	17.9	17.2	16.5	17.1	16.4	15.9	15.9	15.6	15.1
5+	62.1	62.8	64.2	64.3	65.1	66.0	53.1	53.5	56.0
Total	100	100	100	100	100	100	100	100	100

	B: HCSB subsidy amount by business age								
	Average credit amount ($)			Credit as share of employer EI premiums (per cent)			Credit as share of employer EI premiums and payrolls (per cent)		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Age of business									
0	447	469	480	90.0	89.1	88.4	1.9	1.95	1.99
1-2	482	507	527	50.3	50.2	48.8	1.0	1.0	1.0
3-5	382	392	411	32.2	32.1	31.0	0.6	0.6	0.6
5+	353	362	387	21.8	21.7	20.4	0.4	0.4	0.4

Source: NALMF Note: Author's calculations based NALMF data. Businesses considered are only those with positive annual T4s issues and positive payrolls. Dollar amounts are in nominal terms. Business age is determined based on the first time a business' business number is first observed in the NALMF.

4.2.4 Regions

Overall, the regional representation of qualifying businesses and the HCSB payments were similar. Moreover, these distributions followed very closely from the distribution of the universe businesses across Canada. For example, Panel A in Table 4 shows that 35, 20, 15, 15 and 15 per cent of qualifying businesses resided respectively in Ontario, Quebec, Alberta, British Columbia and all other provinces and territories combined. This was very similar to the distribution of firms in the universe of businesses. Panel B of Table 4 shows that per business across region, firms that benefited from the HCSB received between about $340 and $530 in 2013. The highest average credit amounts were paid to businesses located in the Territories; between 2011 and 2013 businesses in the Territories received about 26 to 31 percent more credits than the national average. Finally, as a share of payrolls and EI premiums, the credit amount was no greater than 0.8 per cent in any identified region.

Table 4: Distribution of the HCSB by region

	A: Distribution of businesses (per cent)								
	HCSB qualifying businesses			Universe of businesses			Aggregate HCSB payment		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Region									
Alberta	14.9	15.2	15.3	14.7	15.0	15.2	13.4	13.9	14.4
B.C.	15.9	15.7	15.5	15.7	15.6	15.4	15.4	15.6	15.6
Manitoba	3.1	3.1	3.1	3.1	3.2	3.2	3.3	3.3	3.3
New Brunswick	2.1	2.0	2.0	2.1	2.0	2.0	2.2	2.1	2.1
Newfoundland	1.6	1.6	1.6	1.6	1.6	1.6	1.8	1.7	1.7
Nova Scotia	2.4	2.3	2.3	2.4	2.3	2.3	2.5	2.5	2.4
Ontario	35.3	35.5	35.7	35.5	35.7	35.8	33.9	33.3	33.6
P.E.I	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4
Quebec	20.1	19.9	19.8	20.2	20.0	19.9	22.2	22.2	21.6
Saskatchewan	3.4	3.4	3.5	3.4	3.4	3.4	3.7	3.8	3.8
Territories	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
Missing region	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.6
Total	100	100	100	100	100	100	100	100	100

	B: HCSB subsidy amount by region								
	Average credit amount ($)			Credit as share of employer EI premiums (per cent)			Credit as share of employer EI premiums and payrolls (per cent)		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Region									
Alberta	450	465	492	37.4	37.2	35.0	0.7	0.7	0.7
B.C.	399	412	435	37.2	36.1	33.8	0.7	0.7	0.7
Manitoba	402	412	430	32.3	31.7	30.2	0.6	0.7	0.6
New Brunswick	355	358	380	30.7	30.1	28.8	0.6	0.6	0.6
Newfoundland	323	329	343	35.9	34.9	33.0	0.8	0.8	0.8
Nova Scotia	350	362	378	30.4	29.8	28.5	0.6	0.7	0.6
Ontario	387	395	415	34.1	33.8	32.2	0.7	0.7	0.7
P.E.I	337	344	357	30.5	30.2	28.9	0.7	0.7	0.7
Quebec	357	372	388	31.8	31.6	30.1	0.5	0.5	0.5
Saskatchewan	419	437	462	34.3	34.4	32.3	0.7	0.7	0.7
Territories	506	512	530	33.0	33.0	29.4	0.7	0.7	0.6
Missing region	413	449	435	55.10	51.18	51.10	1.2	1.1	1.1

Source: HALMF Note: Author's calculations based HALMF data. Businesses considered are only those with positive annual T4s issues and positive payrolls. Dollar amounts are in nominal terms. Yukon, The Northwest Territories and Nunavut are grouped into the "Territories." The regional location for some businesses is not identified and are grouped into "Missing region."

4.3.5 Industrial sector

The distribution of firms qualifying for the HCSB was very similar to the distribution of all businesses in the economy.[8] For example, Panels A of Table 5 shows that of HCSB qualifying businesses, about 68.8 per cent were affiliated with the services sector in 2013. This was the same share as in the universe of businesses in the overall economy. In terms of the distribution of payments, however, relatively less of all the credit went to services. For example, in 2013, only about 63.7 per cent of aggregate HCSB payments were made to firms in this sector. This underrepresentation in total credit payments is due to the lower payment per firm; Panel B of Table 5 shows that in 2013 the average firm in service received a credit amount of about $402. This was the second lowest average payout among all sectors. Of interest is that, firms in Mining, Quarrying and Oil/Gas Extraction consistently received greater credit amounts on average than firms in other industries. In 2013, for example, firms in the resource sectors received on

[8] Of note here is that a non-trivial share of firms had missing industry identification.

average about $577 dollars from the credit. This amount was about 10 per cent greater than the average payment in construction, the second highest average payment. Finally, on average, no firm in any identified industry got a subsidy rate greater than one per cent of combined EI employer premiums and payrolls through the HCSB.

Table 5: Distribution of the HCSB by industrial sector

	A: Distribution of businesses (per cent)								
	HCSB qualifying businesses			Universe of businesses			Aggregate HCSB payment		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Industrial sector									
Agriculture, Forestry, Fishing and Hunting	4.7	4.7	4.7	4.5	4.5	4.5	3.7	3.7	3.9
Mining, Quarying, Extraction	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.6	0.6
Utilities	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Construction	10.7	10.7	11.8	10.8	10.8	11.8	12.7	12.9	14.4
Manufacturing	3.2	3.0	3.4	4.0	3.8	4.0	4.2	4.0	4.7
Services	65.3	64.4	68.8	65.6	64.8	68.8	58.9	58.9	63.7
Public administration	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.6
Missing industry	15.1	16.1	10.2	13.9	14.8	9.6	19.3	19.2	12.1
Total	100	100	100	100	100	100	100	100	100

	B: HCSB subsidy amount by business age								
	Average credit amount ($)			Credit as share of employer EI premiums (per cent)			Credit as share of employer EI premiums and payrolls (per cent)		
	2011	2012	2013	2011	2012	2013	2011	2012	2013
Industrial sector									
Agriculture, Forestry, Fishing and Hunting	308	319	345	33.7	32.6	32.2	0.6	0.6	0.6
Mining, Quarying, Extraction	614	575	577	32.7	32.7	30.9	0.5	0.5	0.5
Utilities	418	443	482	21.5	23.0	21.2	0.4	0.4	0.4
Construction	482	492	524	37.3	36.9	36.4	0.6	0.7	0.7
Manufacturing	473	485	521	23.5	23.5	23.6	0.4	0.4	0.4
Services	358	373	402	27.2	27.0	26.3	0.5	0.5	0.5
Public administration	439	439	505	13.9	14.1	12.6	0.3	0.3	0.3
Missing industry	439	442	412	62.2	59.8	63.2	1.2	1.2	1.4

Source: NALMF Note: Author's calculations based NALMF data. Businesses considered are only those with positive annual T4s issues and positive payrolls. Dollar amounts are in nominal terms. Industrial sectors are determined by broad 2-digit NAICS categories

5.0 Incumbent analysis

The challenge of identifying the causal impact of policies like the HCSB is that it is not possible to observe how firms perform both with and without the policy. If this were possible, the performance difference between a firm operating with the policy and the same firm working without the policy would reflect this impact. In lieu of this ability, econometric techniques can be used. These methods exploit differences in gains from the policy that are unrelated to unobserved firm characteristic that also affect performance.

This paper uses DD regressions and RD methods to identify the causal impact of the HCSB. Though different, these methodologies estimate the policy impact by seeing if the performance improvements

among qualifying firms over time was greater than among firms that did not qualify. Each method is discussed in turn in the following subsections.

5.1 Difference-in-difference

The underlying premise of DD regressions in the context of assessing the HCSB is that it is possible to benchmark the performance of firms that qualified for the credit against the performance of firms that did not. In a sense, firms that did not qualify are thought to show what the expected change in performance would have been without the credit. Consequently, the difference in the change in performance between qualifying over none-qualifying firms is taken to reflect the policy's causal impact.

To implement the DD regressions, the following equation is estimated with firm-level panel data,

$$Y_{ft} = \alpha_T Qualify_{ft} \times PostPolicy_t + \alpha_E Qualify_{ft} + \alpha_f + \alpha_t + \varepsilon_{ft}. \quad (1)$$

In Equation (1):

- The variable Y_{ft} reflects firm f's performance (e.g. employment, payroll, productivity) in year t;
- $Qualify_{ft}$ is an indicator variable that equals one if, in the year before t, the firm's EI premium was no more than the threshold to qualify for the credit;
- $PostPolicy_t$ is an indicator variable that equals one for years when the HCSB was in effect; and,
- α_f and α_t are respectively firm-fixed and year-fixed effects.[9]

The key coefficient of interest in Equation (1) is α_T. While the coefficient α_E measures the average performance difference between qualifying and non-qualifying firms in years when the HCSB was not in effect, the coefficient α_T measures by how much this difference improved for qualifying firms once the credit was implemented. As a result, α_T is taken to reflect the causal impact of the HCSB on firm performance. If this coefficient were positive and statistically significant, it would suggest that firms that qualified for the credit after it was implemented improved their performance relative to peers that did not qualify. As a result, one would see evidence that the HCSB was effective. If this coefficient were instead negative or statistically insignificant, no evidence would be observed suggesting that the credit helped firm performance.

A consideration in inferring the causal impact of the HCSB from estimating Equation (1) is that α_T could be determined by general data trends that pre-existed the introduction of the HCSB. In this case, the set of firms that do not qualify for the credit would be ill suited to benchmark the performance of qualifying firms. That is, if the performance of qualifying and non-qualifying businesses were already diverging before the implementation of the credit then, α_T would conflate the possible continuation of these "pre-trends" with any possible impact that the credit might have had. As a result, the evidence from DD estimation would be questionable.

To address the concern of pre-trends, this study tests for the existence of such trends in the data. This analysis is presented in Annex I. Overall, the data do not show pre-trends for employment, payrolls and productivity. As a result, the remainder of Section 5.1 provides the estimates of Equation (1) when only these three variables are set as the dependant variable. A broader look at the effects that the HCSB

[9] Equation (1) could control for additional firm characteristics that affect performance. For the exercise here, no additional controls are included even though this could bias results. However, preliminary analysis using time varying control variables did not change general conclusions. Moreover, as will be seen, the use of firm fixed effects already controls for a substantial portion of the variation in outcomes. Finally, RD results that are less susceptible to missing variable bias are discussed in the next section to show the robustness of the general conclusions reached with DD regressions.

might have had on these variables as well as on firm revenues, investment and R&D expenditures are left for the RD analysis in Section 5.2.

5.1.1 Incumbent sample

The DD analysis uses four years of data from 2009 to 2012. To be included in the sample, firms must have shown consistent evidence of employment in between 2009 and 2012. To show consistent evidence of employment in a given year, businesses must have shown positive: employment as suggested by PD7 issuances, pay rolls, and, employer EI premium contributions. [10] A business is excluded from the sample if any of these three pieces of information are missing or are not positive because it makes uncertain if the firm had employment. As well, to be included businesses must have shown to be incumbents in each of the four sample years. In any given sample year, this was demonstrated by positive EI contributions in the preceding year.

5.1.2 Incumbent difference-in-difference casual impacts

Overall, the empirical evidence suggests that HCSB did not promote incumbent firms growth. Using quasi-Maximum Likelihood Poisson estimation, Panel A of Table 6 shows that all businesses that would have qualified for the credit before its implementation were about 19 per cent smaller in terms of employment and payrolls than their counterparts that would not have qualified. This is expected because the HCSB typically focused on smaller firms. More importantly, estimates of α_T suggest that qualifying firms became smaller once the credit was introduced. Qualifying firms became 2.1 and 3.9 percentage points smaller than non-qualifying firms in terms of employment and payrolls, respectively.

The results in Panel B re-estimate Equation (1) based only on data from incorporated firms and they confirm the conclusion from Panel A; the HCSB does not seem to promote the growth of incorporated businesses. Incorporated firms that would have qualified for the credit in 2009 or 2010 employed 19 per cent fewer workers and paid 20 per cent less in payrolls than corporations that would not have qualified. Once the credit was implemented, employment and payrolls for qualifying businesses decreased respectively by 1.9 and 3.9 percentage points. Given that, these estimates are statistically significant at one per cent, these results suggest that the HCSB did not promote the firm growth and instead that it was associated with a contraction in firm size.

The results in Panel B also suggest that the HCSB did not promote the productivity growth of incorporated firms. Prior to the implementation of the credit, firms that would have qualified for the credit were indistinguishable from their benchmark firms; qualifying firms appeared to have been about 4.1 per cent more productivity but, because this estimate is not statistically significant, there does not seem have been a meaningful difference. Moreover, though after the credit's implementation, qualifying firms appeared to have become relatively more productive by about 2.1 percentage points, this estimated improvement was not statistically different from zero. As a result, the DD estimates imply that the HCSB did not help firms improve their productivity.

[10] These criteria are used to ensure that firms that did not have employment enter the sample due to a data error in one of these three variables.

Table 6: Difference-in-difference impact estimates for incumbents, 2009-2012

	A: All businesses		B: Incorporated businesses		
Dependent variable	Employment	Payroll	Employment	Payroll	Productivity
α_T	-0.021**	-0.039**	-0.019**	-0.039**	0.021
	(0.004)	(0.003)	(0.004)	(0.003)	(0.033)
α_E	-0.185**	-0.194**	-0.190**	-0.204**	0.041
	(0.007)	(0.009)	(0.006)	(0.007)	(0.064)
Firm-fixed effects	YES	YES	YES	YES	YES
Industry-Year fixed effects	YES	YES	YES	YES	YES
R^2	0.99	0.99	0.99	0.99	0.81
Observations	2,120,461	2,120,461	1,567,321	1,567,321	1,478,049

Note: This table shows key coefficient estimates for Equation (1). Panel A is based on data from all firms (i.e. incorporated and unincorporated businesses) while Panel B is based only on incorporated businesses. The number of observations differ depending on the dependent variable used because data for these variables maybe missing for different observations. Samples may be unbalanced due to missing NAICS information in some years. Industry-year fixed effects are based on 2-digit NAICS classes. Poisson quasi-maximum likelihood estimation is used to estimate Equation (1). Robust standard errors in parentheses. ** 1 per cent significance, *5 per cent significance.

Analysis based on DD regressions does not suggest that the HCSB had a positive impact on the performance of businesses. However, it is difficult to believe that the credit caused a relative decrease in performance as suggested by the negative and statistically significant estimates of α_T for employment and payroll growth. Misspecification of Equation (1) could be responsible for these results if an important time-varying firm control is missing that would bias the estimate of α_T. To account for this potential bias, the next sub-section utilizes RD methods, methods that do not depend on the correct specification of regression equations, to determine the causal impact of policies like the HCSB.

5.2 Regression discontinuity

This study uses RD analysis for two reasons. First, an inability to control correctly for time-varying firm characteristics in the DD regression estimates could confound analysis based on DD regressions. And, second, credit eligibility implies that eligible firms will be different from their comparison group (e.g. businesses eligible for the credit will be smaller than those that are ineligible). As a result, businesses that did not qualify might not be an appropriate benchmark off which to measure the gains of businesses that were eligible. RD methods can avoid these problems and add some robustness to the main conclusion reached with the DD analysis that the HCSB did not promote firm growth or performance.

RD analysis addresses concerns that might weaken DD results by focusing on businesses near the EI premium threshold that determined credit eligibility. The intuition for this is as follows: if firms were unable to manipulate *perfectly* their EI premiums then, randomness would be an important factor determining eligibility for firms close to the threshold. In this case, differences in firm characteristics would be independent of eligibility status and a direct comparison between eligible and ineligible businesses near the threshold can give an unbiased estimate of the impact of the HCSB.

To implement the RD method in the context of the HCSB, the local polynomial regression represented by Equation (2) is estimated.[11]

$$\Delta Y_f = \alpha_T Qualify_f + \sum_{i=0}^{N} \beta_i (EI\ Premium_f)^i + \sum_{i=0}^{N} \gamma_i (EI\ Premium_f)^i \times Qualify_f + \omega_f. \quad (2)$$

In Equation (2), ΔY_f represents the percentage change in firm f's performance from an initial year t to a subsequent year t',[12] $Qualify_f$ is an indicator variable identifying if f qualified for the credit by having paid no more than the EI premium threshold in year t, and $EI\ Premium_f$ reflects the EI premiums f paid in t. As a result, Equation (2) explains changes in firm performance as a function of whether firms qualified for the HCSB and a polynomial function of the firm's EI premiums. Other explanatory factors can be ignored because, by the construction of the sample around the HCSB qualifying threshold, firms above and below this threshold are nearly randomly assigned.

The coefficient of interest in Equation (2) is α_T. This is because the coefficient will indicate whether businesses that qualified for the credit on average improved their performance by more than firms that did not qualify. If the credit was effective, the resulting performance bump should have been systematic enough to yield a positive and statistically significant estimate of α_T.

Two assumptions underpin the validity of the RD method. To be convincing studies utilizing RD typically test for these. In the context of the HCSB, the first test examines if firms manipulated the EI premiums they paid in period t in order to benefit from the credit. This is an important test because, if firms succeeded in manipulating their premiums then, estimates of α_T could be susceptible to selection bias.[13] The second test investigates if, *ex-ante*, firms above and below the qualifying threshold were already systematically different. The rationale for this is that if firms above the threshold were innately different then, they could not serve as a valid benchmark for firms below the threshold. This test is implemented by estimating Equation (2) on firm characteristics that were predetermined before the introduction of the HCSB.

Both tests examining the validity of RD methods in this study are presented in Appendix II. In general, the results suggest RD analysis is valid to assess the effectiveness of the HCSB. The remainder of Section 5.2 presents this assessment.

5.2.1 RD Results

Results on the effectiveness of the HCSB focus on the improvement the credit might have had on year-over-year growth from 2010 to 2011 and from 2012 to 2013. For businesses that went out of business from one year to the next, the change in performance used to calculate their growth rate was set to equal the full amount in the base year. For example, the change in employment experienced by a

[11] The regression is considered to be "local" because only observations around the qualifying threshold are used.

[12] To be specific, $\Delta Y_f = \frac{Y_{ft'} - Y_{ft}}{average(Y_{ft}, Y_{ft'})} \times 100$. The base of this change is the average value between years to minimize the possible effects of mean reversion.

[13] With selection bias, the estimate of α_T could exaggerate the impact of the credit by confounding improvements in firm performance that would have happened even without the credit's benefit. For example, firms that knew they would have grown in size between year t and t' even without the credit might have reduced their employment in year t to bring their EI premiums below the HCSB threshold.

business that initially employed 50 people in 2010 but that was not in business in 2011 was set equal to -50.[14]

5.2.1.1 Impact on employment and payrolls

Table 7 shows estimates of the coefficient α_T that confirm the general conclusion from the DD analysis in Section 5.1.2; the RD estimates show that the HCSB did not promote businesses growth. Based on local polynomial regressions of degree 2, Table 7 shows that growth in employment and payrolls of all qualifying firms was not different from what was experienced by firms that did not qualify.[15]

For all businesses, Panel A.1 shows the estimated impact of the credit on the employment and payroll growth rate from 2010 to 2011, when qualifying firms needed to have paid no more than $10,000 in EI premiums in 2010. For employment and payrolls alike, the increase in the growth rate that the credit provided was not statistically different from zero even though the point estimates are respectively about 1.2 and 1.4 percentage points. Similarly, Panel A.2 suggests that when the qualifying threshold was raised to $15,000 in 2012, the credit also did not raise the annual growth rate of employment and payrolls from 2012 to 2013. The estimates for α_T were negative but, again, not statistically different from zero.

Evidence for incorporated businesses shown in Panel B of Table 7 are similar to those of Panel A; these results also suggest that the HCSB did not have a positive impact on growth. For example, incorporated businesses qualifying for the credit based on their 2010 EI premiums saw their employment growth rate to be 0.6 percentage points higher than if they had not qualified. However, this improvement was not systematic enough to be statistically significant.

[14] Results are equivalent if businesses that went out of businesses in year t' are excluded from the sample. This suggests that the way growth is calculated for exiting businesses does not drive results.

[15] Lower order local polynomial regressions were estimated. These results are not shown but their conclusions are consistent with what is shown in Table 7; estimates of α_T in Equation (2) are also statistically insignificant and suggest that the HCSB did not promote firm performance.

Table 7: Regression discontinuity results for employment and payrolls, annual growth rates (percentage points)

	Panel A: All businesses			
	Panel A.1: Year-over-year from 2010		Panel A.2: Year-over-year from 2012	
	Employment	Payroll	Employment	Payroll
α_T	1.233	1.372	-1.288	-0.464
	(0.863)	(0.858)	(0.822)	(0.802)
Bandwidth	3,464	3,317	6,341	6,159
Observations	64,358	61,150	69,476	66,929
	Panel B: Incorporated businesses			
	Panel B.1: Year-over-year from 2010		Panel B.2: Year-over-year from 2012	
	Employment	Payroll	Employment	Payroll
α_T	0.570	0.821	-0.930	-0.322
	(0.787)	(0.848)	(0.844)	(0.811)
Bandwidth	4,047	3,343	6,127	6,117
Observations	70,687	55,995	60,732	60,602

Note: This table shows the RD estimates for the impact of the HCSB for all businesses and for only incorporated businesses. Panel A.1 and B.1 estimate the incremental impact on firm growth from 2010 to 2011. As a result, for these panels, the indicator variable Qualify in Equation (2) is defined by whether in 2010, EI premiums were no greater than $10,000. Panel A.2 and B.2 show the year-over-year impact of the credit from 2012. As a result the indicator Qualify in Equation (2) is defined by the $15,000 EI premium threshold. Local area polynomial regressions are used to estimate the HCSB impact. These regressions use a triangular kernel to give observations closer to the qualification threshold more influence. Finally, a symmetric neighborhood using the stated bandwidth (expressed in dollars) around the EI threshold is implemented to determine the sample. Significance based on conventional standard errors are shown in parenthesis. **1 per cent significance, *5 per cent

5.2.1.2 Productivity, revenues, investment, and R&D

Table 8 illustrates more broadly, though only for incorporated businesses, that the HCSB did not have a positive impact on firm performance. It does so by investigating the credits impact on the growth rate of productivity and revenue (Panel A) and on the change in investment and R&D expenditures (Panel B).[16]

For productivity and revenue, the credit's impact on growth is not observed year-over-year from 2010, Panel A.1. Productivity growth was about 6.1 percentage points higher while revenue growth was lower by 0.2 percentage points for qualifying businesses. However, neither impact was statistically different from zero. From 2012, once the qualifying threshold increased to $15,000 in EI premiums, the credit is also not seen to have improved performance, Panel A.2. Year-over-year productivity and revenue growth for qualifying businesses increased respectively by about 3.2 and 1.6 percentage points. However, neither increase was statistically different from zero.

Finally, for investment and R&D expenditures, the credit is also not seen to have had a positive impact. Panel B of Table 8 shows the absolute change in the investment and R&D rather than the percentage point difference in growth. Estimates α_T show that in all except for the change in R&D for qualifying corporations in 2012, the impact of the HCSB was not statistically different from zero. Moreover, for R&D, the estimated impact suggests that the HCSB decreased expenditures by about $3,500 as this estimate is statistically significant at 1 per cent.

[16] For investment and R&D, the analysis is based on the absolute change in this measure because expressing the impact in terms of growth rates leaves this dependant measure undefined for the majority of businesses. A large share of firms did not undertake investment or R&D and so the growth rate, the dependant variable, of the local polynomial regressions is undefined.

Table 8: Regression discontinuity results for productivity, revenues, investment and R&D expenditures

	Panel A: Percentage points			
	Panel A.1: Year-over-year from 2010		Panel A.2: Year-over-year from 2012	
	Productivity	Revenue	Productivity	Revenue
α_T	6.138	-0.190	3.220	1.563
	(10.712)	(1.731)	(16.18)	(5.209)
Bandwidth	2,068	2,117	3,263	2,139
Observations	32,757	33,494	29,173	18,642

	Panel B: Absolute increase ($1,000)			
	Panel B.1: Year-over-year from 2010		Panel B.2: Year-over-year from 2012	
	Investment	R&D	Investment	R&D
α_T	-33.849	2.018	-4.247	-3.488**
	(22.290)	(2.233)	(7.369)	(1.125)
Bandwidth	4,730	6,267	10,215	4,859
Observations	85,952	132,498	134,839	45,232

Note: This table shows the RD estimates for the impact of the HCSB for all businesses and for only incorporated businesses. Panel A.1 and B.1 estimate the incremental impact on firm growth from 2010 to 2011. As a result, for these panels, the indicator variable Qualify in Equation (2) is defined by whether in 2010, EI premiums were no greater than $10,000. Panel A.2 and B.2 show the year-over-year impact of the credit from 2012. As a result the indicator Qualify in Equation (2) is defined by the $15,000 EI premium threshold. Local area polynomial regressions are used to estimate the HCSB impact. These regressions use a triangular kernel to give observations closer to the qualification threshold more influence. Finally, a symmetric neighborhood using the stated bandwidth (expressed in dollars) around the EI threshold is implemented to determine the sample. Significance based on conventional standard errors are shown in parenthesis. ** 1 per cent significance, * 5 per cent significance.

In total, RD analysis is consistent with results from the DD regressions. Both methods suggest that the HCSB did not have a statistically significant impact on the performance of incumbent businesses.

6.0 Entry

This section analyses firm entry patterns to evaluate if the HCSB induced growth through its effect on new businesses. To this end, Section 6.1 tests if the credit helped more firms enter the market. Section 6.2 uses DD regressions to examine if businesses that entered the market after the implementation of the credit on average: employed more workers, had greater payrolls, were more productive, earned more revenues, made greater investments or spent more in R&D. As above, the validity of using DD regressions is assessed by testing for pre-trends in the data. Appendix III presents these tests and provides evidence validating the use of DD regressions in this section.

In the context of this study, the terms "new firm," "entrant" or "start-up" refer to the same type of firm. In a given year, this type of firm shows consistent evidence of employment (i.e. positive employment as suggested by the PD7 form, positive payrolls, and positive EI premiums) after showing consistent signs of not employing anybody in the previous year. This can come about when a firm did not exist. It can also occur when a firm existed in the previous year but did not employ workers in that year.

6.1 Entry counts and propensities

One way the HCSB might have promoted growth was by helping more firms start up. This section studies this in two ways. The analysis first assess if the absolute number of entrants increased after the introduction of the HCSB. This is a preliminary attempt to see if the credit had an effect because general economic growth is likely to have led to an increase in the number of start-ups. For this reason, the study also examines entry propensity patterns. This is done by benchmarking the number of entrants

against the number of all incumbent firms. However, benchmarking entry against all incumbents businesses allows the influence of many small incumbents that benefited from the credit to affect measured entry propensities; if the credit boosted the numbers of small incumbents, it would offset any relative increase in entrants that the credit also encouraged. As a result, to get a better sense of the HCSB, entry is also benchmarked against the numbers of incumbents that did not benefit from the credit.

To assess if the number of entrants increased after the implementation of the HCSB, we use data from 2007 to 2012 to estimate following equation,

$$Y_{it} = \alpha_{post} PostPolicy_t + \alpha_i + \omega_{it}. \quad (3)$$

In Equation (3), Y_{it} reflects the number of firm entrants in the 2-digit NAICS industry i in year t. The entrant measure is in terms of either the absolute number of entrants or the entrant propensity, the number of entrants relative to incumbent firms. The variable $PostPolicy_t$ is an indicator variable that equals 1 when the year falls on or after the implementation of the HCSB. α_i is industry i's fixed effect. In Equation (3), α_{post} is the key coefficient because it indicates by how much the number of entrants increased on average across industries once the credit was introduced.

6.1.1 Entry counts

With the absolute number of start-ups as the dependant variable, estimates of Equation (3) suggest the HCSB did not coincide with an increase in entry. Column (I) in Table 9 shows that, for all businesses, the number of entrants decreased by about 11 per cent once the HCSB was introduction. However, because this estimate is not statistically significant, it appears that the number of entrants was largely unchanged. Similar, Column (II) shows entry patterns for incorporated firms were also unchanged; while the point estimate suggests that the number incorporated firms decreased by about 5 per cent, this change was not statistically significant.

Table 9: Entry counts

	All businesses (I)	Incorporated businesses (II)
α_{post}	-0.111	-0.047
	(0.065)	(0.034)
Industry-fixed effects	YES	YES
R^2	0.98	0.99
Observations	150	150

Note: This table shows the estimate of the key coefficient in Equation (3) that assesses the impact of the HCSB on the absolute annual number of entrants. Industry-fixed effects are based on 2-digit NAICS industries categories. Results are based on Poisson quasi-maximum likelihood estimation. Significance is based on robust standard errors that are shown in parenthesis. ** 1per cent significance, * 5 per cent significance.

6.1.2 Entry propensity

A simple way to improve the analysis of Section 6.1.1 is by benchmarking the number of start-ups against the number of incumbents. This would improve the analysis by helping somewhat control for

trends affecting the number of entrants but that are unrelated to the HCSB. In this section, this is done by using the entrant propensity (i.e. the ratio of entrants to incumbents) as the dependant variable in Equation (3).

Overall, Table 10 shows the entrant propensity did not change in a statistically significant with the HCSB was introduced. For example, when all businesses are used to estimate Equation (3) and entrants are compared against all incumbents, Column (I) shows that the entrant propensity decreased by about 2.3 percentage points. However, this change is not statically significant. Similarly, when focusing on only incorporated firms, Column (III) shows the entrant propensity decreased by 2.1 percentage points but that it was also not statistically insignificant. Qualitatively, the same conclusion is reached when incumbents that were too big to qualify for the HCSB benchmark the number of entrants. Columns (II) and (IV) of Table 10 show that the entry propensity declined in relative terms but that this change was not statistically significant.

Table 10: Entry propensity

	All businesses		Incorporated businesses	
Benchmark	All incumbents (I)	Non-qualifying incumbents (II)	All incumbents (III)	Non-qualifying incumbents (IV)
α_{post}	-0.023	-0.685	-0.021	-0.476
	(0.013)	(0.484)	(0.014)	(0.376)
Industry-fixed effects	YES	YES	YES	YES
R^2	0.754	0.857	0.700	0.782
Observations	150	150	150	150

Note: This table shows the estimate of the key coefficient in Equation (3) that assesses the impact of the HCSB on entry propensity. The dependent variable is simply the ratio of number of entering firm in each 2-digit NAICS industry relative to the number of incumbent firms in the same industry. Benchmark refers to what incumbent firms entrants are compared. Results are based on OLS estimation. Significance is based on robust standard errors that are shown in parenthesis. **1per cent significance, *5 per cent significance.

6.2 Performance: Difference-in-difference

Despite not finding evidence that the HCSB encouraged businesses entry, the credit could have helped improve the growth and the performance entering businesses. For example, entering firms could have been made bigger or more productivity. To address this question, this section uses DD regressions to assess if the performance of entrants improved with the credit's implementation. As a benchmark, these regressions use incumbents that would not have qualified for the credit. This is done specifically to minimize the potential influence that the credit might have had on benchmark firms. As in Section 6.1, not eliminating incumbents that qualified for the credit could make the average performance difference between entrants and benchmarks harder to observe; if the performance of benchmark firms improved due to the credit, this improved performance would mitigate the relative *observed* improvement that the credit might have induced entering firms to have.

In the context of the HCSB, the DD framework is implemented by using data from 2009 to 2012 to estimate the following equation,

$$Y_{ft} = \alpha_T Entrant_{ft} \times PostPolicy_t + \alpha_E Entrant_{ft} + \alpha_{it} + \varepsilon_{ft}. \quad (4)$$

Equation (4) is a simplified version of Equation (1). Specifically, given that entrants only appear once in the sample, it is not possible to use firm fixed effects as in Equation (1). Instead, 2-digit industry-year

fixed effects (i.e. α_{lt}) are used to control for composition effects of businesses over time. Otherwise, in Equation (4):

- Y_{ft} reflects firm f's performance (e.g. employment, payroll, productivity) in year t;
- $Entrant_{ft}$ is a dummy variable that equals one when f is a start-up in year t; and,
- $PostPolicy_t$ is a dummy that identifies sample years during which the HCSB was in effect (i.e. 2011 and 2012).

In this framework, the coefficient α_E approximates the average difference in performance between entrants and incumbent firms before the implementation of the credit. As a result, the key parameter of interest is α_T. This coefficient show by how much the initial average difference between entrants and incumbents changed with the implementation of the credit.

As mentioned in Section 5.1, pre-trends in the data may invalidate the estimates and conclusions based on DD regressions. As a result, to provide more convincing evidence, Appendix III presents analysis that tests for these pre-trends. In general, the results show no evidence of pre-trends in the data.

6.2.1 Employment and payrolls

The only evidence suggesting that the HCSB had a positive impact on firm growth is with respect to the employment and payroll performance of entering firms. Specifically, the evidence suggests that unincorporated businesses that entered in 2011 or 2012 saw improved performance relative to benchmark firms. This finding cannot be discounted but it needs to be considered cautiously given the abundant evidence suggesting that the HCSB generally did not have a positive impact on firm performance; randomness can be expected to lead occasionally to false positives.

Panel A of Table 11 shows that, among all businesses in 2009 and 2010, entrants were substantially smaller than incumbents that were too big to qualify for the HCSB. For example, entrants employed about 350 per cent fewer workers, Column (I). This difference was stark enough to be statistically significant at one percent. More importantly, by being statistically significant at one percent, the estimates suggest that entrants grew in relative terms by closing the initial gap by 19 percentage points once the credit was introduced. Similarly, Column (II) shows that entrant payrolls were about 380 per cent lower than that of incumbents before the credit's introduction. However, incumbent payrolls increased relatively by about 26 percentage points with the introduction of the credit. This relative improvement in performance was statistically significant at five per cent.

When the sample is limited to incorporated businesses, estimates of Equation (4) suggest that the credit did not have a positive impact on firm performance. Panel B of Table 11 shows that entrants were once again considerably smaller than incumbents. However, the introduction of the credit does not coincide with a relative increase in the size of entrants; the relative estimated increases in employment (10 percentage points) and payrolls (3 percentage points) are not statistically significant.

In total, the statistical significance and magnitude of estimates for α_T between Panel A and B allude that unincorporated entrants benefitted from the HCSB; these firms seem entirely responsible for the statistical significance of the estimated impact of the credit in Panel A.

Table 11: Difference-in-difference impact estimates for entrants, 2009-2012

	A: All businesses		B: Incorporated businesses	
Dependent variable	Employment (I)	Payroll (II)	Employment (III)	Payroll (IV)
α_T	0.185**	0.264*	0.098	0.030
	(0.061)	(0.124)	(0.060)	(0.086)
α_E	-3.538**	-3.833**	-2.966**	-3.238**
	(0.037)	(0.058)	(0.049)	(0.072)
Industry-year fixed effects	YES	YES	YES	YES
R^2	0.25	0.26	0.15	0.17
Observations	584,160	584,160	430,449	430,449

Note: This table shows key coefficient estimates for Equation (4). Panel A is based on data from all businesses (i.e. incorporated and unincorporated businesses) while Panel B is based only on incorporated businesses. Industry-year fixed effects are based on 2-digit NAICS industry categories. Benchmark businesses are those that, in a given year, did not qualify for the HCSB. Results are based on Poisson quasi-maximum likelihood estimation. Significance is based on robust standard errors that are shown in parenthesis. **1 percent significance, *5 percent significance.

6.2.2 Productivity, revenues, investment and R&D spending

The HCSB does not seem to have promoted productivity, revenue, investment and R&D spending growth for incorporated firms that entered the market in 2011 or 2012. Table 12 presents estimates of Equation (4) when these different margins are used as the dependent variable and when the sample of firms considered is limited to only incorporated firms. In general, entrants are estimated to have been smaller in a statistically significant way than incumbents before the implementation of the HCSB. For example, entrants were about 75 per cent less productive than incumbents. Similarly, entrant R&D spending was about 320 per cent lower than that of incumbents. More importantly, with the introduction of the credit, these initial differences did not change in a meaningful way. For productivity, entrants could have become less productive by about 14 percentage points. It is instead more likely that the initial difference was unchanged because the estimated change is not statistically significant. Similarly for R&D spending, the point estimate for α_T suggests that entrants decreased their spending by an additional 30 percentage points but because this change was statistically insignificant, the HCSB does not seem to have had an impact.

Table 12: Difference-in-difference impact estimates for entrants, 2009-2012

Dependent variable	Productivity (I)	Revenues (II)	Investment (III)	R&D (IV)
α_T	-0.144	0.114	-0.625	-0.302
	(0.142)	(0.080)	(0.436)	(0.317)
α_E	-0.748**	-3.101**	-0.809*	-3.222**
	(0.138)	(0.059)	(0.340)	(0.178)
Industry-year fixed effects	YES	YES	YES	YES
R^2	0.19	0.18	0.15	0.24
Observations	411,700	429,624	430,449	430,449

Note: This table shows key coefficient estimates for Equation (4). Panel A is based on data from all businesses (i.e. incorporated and unincorporated businesses) while Panel B is based only on incorporated businesses. Industry-year fixed effects are based on 2-digit NAICS industry categories. Benchmark businesses are those that, in a given year, did not qualify for the HCSB. Results are based on Poisson quasi-maximum likelihood estimation. Significance is based on robust standard errors that are shown in parenthesis. **1per cent significance, *5 per cent significance.

Overall, the evidence on the possible impact the HCSB might have had on entrants is mixed. DD results suggest that the credit might have helped induce the entry of unincorporated firms that were larger in terms of employment and payrolls. Otherwise, consistent with all other results presented in this paper, the credit does not seem to have had an impact on entrants: the credit does not seem to have helped more businesses to enter nor does it seem have improved the performance of incorporated firms on any dimension.

7.0 Conclusion

This study assess if the HCSB implemented from 2011 to 2013 succeeded in promoting the performance of eligible firms. Multiple empirical techniques meant to infer the causal impact of the credit were used. Moreover, the analysis has looked for a potential impact over various firm outcomes (i.e. employment, payrolls, productivity, revenues, investment and R&D spending). All told, the introduction of the credit does not seem to have had a meaningful impact. Some evidence is found that the credit increased the employment and payrolls of unincorporated start-ups. However, judged against the preponderance of evidence as well the possibility that due to randomness it is possible to obtain false positives, these two positive results should be considered cautiously.

A potential reason why the credit was generally ineffective at improving firm performance is that it was unconditional; firms automatically qualified for the credit if their EI premiums were low enough and they did not need to improve their performance to receive any benefit. Another potential reason why the credit seemed ineffective is that the subsidy was small. As a share of broader labour costs (i.e. the combined cost of payrolls and EI employer premiums), the credit was usually no greater than two per cent for different types of businesses and on average, for all businesses, was less than one per cent.

The analysis in this study attempts to be definitive but various caveats are still necessary. One important consideration is that the specification of the DD regressions are parsimonious. For example, variables controlling for time varying firm characteristics are not used. As a result, omitted variables could bias the results. Despite this, it is unknown in what direction the bias could work; if a bias exists, it is uncertain whether it would change results dramatically enough to suggest that the credit helped improve performance. As well, at least for the analysis of incumbent businesses, the RD analysis that is

unaffected by misspecification, corroborates the conclusion from DD estimates that the HCSB did not promote firm performance.

Another potential caveat is that the impact of the credit could have been too diffused to be observed in the data. For example, some firms might have used the credit to hire relatively more workers. Others might have paid existing workers more while still other firms might have invested the credit on a new piece of machinery or in R&D. Consequently, given the level of noise in the data, improvements in firm performance along any one margin might have been spread too thinly to be observed.

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Annex I: Incumbent pre-trends

To make DD regression results convincing, studies using this method test for pre-trends in the data. Ultimately, these tests are intended to bolster the underlying assumption that entities unaffected by a policy serve as a good benchmark for how affected entities would have performed without the policy.

In this study, pre-tends are tested by replicating the analysis described in Section 5.1 with two alterations. First, estimation of Equation (1) uses data from the 2007-2010 period rather than the 2009-2012 period. And, second, the definition of the variable $PostPolicy_t$ in Equation (1) is changed so that it equals one for observation in 2009 and 2010. In this framework, the pre-trend test is a placebo test. Given the HCSB was implemented after 2010, pretending the credit was in effect in 2009 and 2010 should leave estimates of α_T statistically insignificant. Finding evidence to the contrary would suggest that diverging trends in the data existed prior to the HCSB and that their possible continuation could influence DD estimates of the credit's impact.[17]

Pre-trend test results do not show evidence of divergences in the data prior to 2011 for employment, payrolls and productivity. However, there is some evidence of pre-trends for revenues, investment and R&D spending. Estimates of α_E and α_T from Equation (1) in Panel A of Table Annex I are based on the sample of all businesses when employment and payrolls are used as the dependant variables. As should be expected, businesses that would have qualified for the credit were smaller on average; the estimate of α_E is negative and statistically significant and suggests qualifying firms employed about 21 per cent fewer people and had payrolls that were about 25 per cent lower than businesses that would not have qualified for the credit. More importantly, these differences did not change over time (i.e. after 2008); estimates of α_T are small in magnitude and statistically insignificant. This finding suggests no pre-trends exist in the data that could influence the findings in Section 5.1 when employment and payrolls are used as the performance outcomes.

For incorporated firms, the estimates of α_T also suggest that there were no pre-trends for employment and payrolls. Panel B of Table Annex I suggests that these coefficients are also statistically insignificant. Moreover, this table also shows that firm productivity did not have pre-trends. The point estimate of α_T is negative but it is not statistically different from zero when productivity is used as the dependent variable.

In contrast, the last three columns of Panel B in Table Annex I suggest that pre-trends existed for revenues, investment and R&D investments. Revenues of businesses that would have qualified for the credit were about 17 per cent lower than for businesses that would not have qualified. More importantly, these results suggest that revenues on average decreased in relative terms by 2.6 percentage points. Given the statistical significance at five percent for this estimate, α_T suggests that pre-existing trends in the data prior to the credit's introduction could invalidate DD analysis searching for the impact of the credit over the 2009-2012 period.

For investment and R&D expenditures, Panel B of Table Annex I shows evidence suggesting pre-trends existed that could exaggerate the positive impact of the HCSB. For both performance measures, businesses that would have qualified for the credit are seen to have increased investment or R&D spending versus non-qualifying firms. Given this observed increased occurred prior to when the HCSB

[17] Alternatively, a statistically significant estimate of α_T could suggest that time-varying variables in Equation (1) are omitted, generally biasing estimates of α_T.

was actually implemented, it suggests that pre-trends existed that would lead estimates of the impact of the credit to positive.

As a result of test results in this section, Section 5.1 focuses on performance dimensions that do not seem to have had pre-trends (i.e. employment, payrolls and productivity). Analysis for revenues, investment and R&D spending are excluded from Section 5.1 given that they might be influenced by the pre-trends identified in this Annex. However, though not shown, the point estimates of α_T for these performance margins based on data between 2009 and 2012 do not indicate that the HCSB had a positive impact; estimates are either negative or statistically insignificant if positive.

Table Annex I: Difference-in-difference impact estimates for incumbents, 2007-2010

	A: All businesses		B: Incoroporated businesses					
Estimation method	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson	OLS	OLS
Dependant variable	Employment	Payroll	Employment	Payroll	Productivity	Revenues	Investment	R&D
α_T	0.002	0.005	0.005	0.006	-0.009	-0.026*	42.4*	11.3*
	(0.004)	(0.004)	(0.004)	(0.005)	(0.032)	(0.011)	(20.3)	(5.3)
α_E	-0.213**	-0.249**	-0.213**	-0.249**	0.023	-0.169**	-9.2	-12.1**
	(0.006)	(0.009)	(0.006)	(0.008)	(0.029)	(0.024)	(11.5)	(3.1)
Firm-fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
R^2	0.99	0.99	0.99	0.99	0.72	0.96	0.657	0.921
Observations	2,084,270	2,084,270	1,513,710	1,513,710	1,425,553	1,503,393	1,514,352	1,514,352

Note: This table shows key coefficient estimates for Equation (1). Panel A is based on data from all firms (i.e. incorporated and unincorporated businesses) while Panel B is based only on incorporated businesses. The number of observations differ depending on the dependent variable used because data for these variables maybe missing for different observations. Samples may be unbalanced due to missing NAICS information in some years. Industry-year fixed effects are based on 2-digit NAICS classes. Poisson quasi-maximum likelihood estimation is used to estimate Equation (1). Robust standard errors in parentheses. **1 percent significance, *5 per cent significance.

Annex II: Tests to validate RD analysis

4.2.1 Manipulation

The RD analysis performed in this paper can be invalidated if businesses had sufficient control of the EI premiums they paid to determine whether they would qualify for the HCSB. Such control ultimately can lead to biased impact estimates. For example, a business that foresees it will expand its workforce next year might find it beneficial to qualify for the credit in the current year by curtailing its employment in the current year. In this situation, RD estimates are exaggerated. Growth that would have happened anyway would be attributed to the credit. Moreover, "fake" growth would occur if the firm undoes the decrease in employment it undertook solely to qualify for the credit. This extra growth would also be attributed to the credit. Ultimately, manipulation is troublesome because firms that were just unable to qualify for the credit would not be comparable to those firms that managed to qualify.

A priori, in the context of the HCSB, it is unlikely firms were able to manipulate their EI premiums in 2010 and 2012. This is because the qualifying thresholds were unknown. The $10,000 threshold for 2010 was first announced in Budget 2011, after 2010 employer EI premiums should have been determined. Similarly, the $15,000 threshold for 2012 was first announced in Budget 2013, after 2012 employer EI premiums should have been determined. Therefore, it does not seem possible that firms had reasonable control to target their position around the HCSB thresholds.

Sole reliance on the argument why firms were unable to manipulate their EI premiums is unnecessary to substantiate the use of RD. McCrary (2008) proposes a direct test of manipulation by examining the

distribution of businesses close to the qualifying thresholds. If businesses were unable to manipulate precisely their EI premiums then, the distribution around the threshold should be smooth. In contrast, if there was manipulation, one should expect a conspicuous clustering of firms below the threshold and a conspicuous ebb after the threshold as businesses above managed to fall below the threshold to qualify for the credit. This would result in a discontinuous change in the distribution from one side of the qualifying threshold to the other.

Table Annex II.A presents the McCrary test for distribution of firms over EI premiums at the qualifying cut-offs in 2010 and 2012. The null hypothesis is that there is no log discontinuity (i.e. firms did not manipulate). Overall, no evidence is evident that firms manipulated their EI premiums; the measured discontinuities at the thresholds are too small relative to their standard errors to suggest statistically significant jumps in the distribution. For example, for all businesses in 2010, the log discontinuity was 0.019 and the standard error was 0.020. As a result the t-statistic is less than one and too small to reflect a statistically significant discontinuity at five per cent or better. Similarly, for incorporated businesses in 2010, the log discontinuity was 0.028 while the standard error was 0.020. The related t-statistic is again too small to be statistically significant at five per cent or better.

Table Annex II.A: McCrary (2008) discontinuity test

	All businesses		Incorporated businesses	
	2010	2012	2010	2012
Log discontinuity	0.019	-0.004	0.028	-0.013
	(0.020)	(0.024)	(0.020)	(0.024)

Note: Test statistics of the McCrary discontinuity test shown with standard errors in parenthesis. The resulting t-statistics are too small to reject the null of a discontinuity at the HCSB thresholds at five percent significance or better. The HCSB qualifying thresholds in 2010 and 2012 were $ 10,000 and $ 15,000 respectively.

4.2.2 *Ex-ante* differences

Given that there was no manipulation, the RD analysis might still be flawed if firms below and above the threshold are not sufficiently similar to each other. If this is the case then, businesses above the qualifying threshold cannot be considered to be a good benchmark against which to assess the impact of the credit.

To verify if businesses are sufficiently similar, we estimate Equation (2) on different pre-determined characteristics.[18] That is, the RD analysis is used to assess if there are observable differences between firms above and below the qualifying threshold in the year before EI premiums determine if firms qualified for the HCSB. For example, to see if firms that qualified for the HCSB based on the premiums they paid in 2010, we estimate if there were differences between firms based on characteristics in 2009. For the sample of all businesses, the "covariates" are mostly the level form of the same variables used to assess if the HCSB promoted performance: employment and payrolls. For incorporated firms the pre-determined characteristics are the levels of: total assets, productivity, revenues, investment, R&D and the incidence to undertake R&D. In general, there are no significant differences in the average level of these characteristics between firms above and below the qualifying thresholds.[19]

[18] Equation (2) is estimated using a polynomial order of 1.

[19] To economize on vetting time needed to release results from Statistics Canada, employment and payrolls are not used to test if incorporated businesses above and below the qualifying thresholds differ.

Table Appendix II.B shows the average difference in covariate values of firms found below and above the qualifying threshold. Generally, no pre-existing differences between these businesses are found. Though the differences were at times large, these differences were not systematic enough to conclude that businesses above the threshold would not be a good benchmark for those below the threshold. As well, though there seems to be a difference in the incidence to conduct R&D in 2010 for incorporated businesses, this does not jeopardize the use of RD. This was the only statically significand difference and the difference seems economically small at only about 1.7 percentage points. Consequently, the evidence in Table Appendix II.B suggests the firms above the threshold are sufficiently similar to those that qualified for the HCSB to serve as a benchmark to assess the credit's impact.

Table Appendix II.B: Pre-determined covariate test

	Bandwidth	Number of observations	Average difference	Standard error
		A: All businesses		
Qualifying year: 2010				
Workers	4,359	85,798	0.102	0.1829
T4 Payroll	5,877	134,345	5,502.65	7318
Qualifying year: 2012				
Workers	5,301	55,311	-0.078	0.24194
T4 Payroll	4,396	44,495	5,249.91	12327
		B: Incorporated businesses		
Qualifying year: 2010				
Total Assets	4,135	72,694	-1,227,779	3783574
Productivity	7,465	188,185	1.28	3.443
Revenues	5,448	106,579	-92,702	278367
Investment	4,387	78,436	-2,022	6380
R&D	4,097	71,808	-2,954	1695
R&D Incidence	3,044	50,247	-0.017 **	0.005
Qualifying year: 2012				
Total Assets	8,585	98,972	-4,998,880	3753496
Productivity	6,438	64,700	-6.50	5.885
Revenues	3,696	33,740	132,321	367657
Investment	18,711	466,092	-29,845	21965
R&D	7,557	80,986	928	2056
R&D Incidence	7,057	73,433	0.003	0.005

Note: Results are based on local area polynomial regression of order 1, triangular kernel and a symmetric bandwidth. Values on which businesses are compared are from the year before the qualifying year. EI premiums in the qualifying year are used to determine which businesses qualify and which do not. Significance based on conventional standard errors. **, * represents statistical significance at 1 and 5 per cent respectively.

Annex III: Entrant pre-trends

This annex tests for pre-trends in the data that would weaken analysis in Section 6.2 that tests whether the HCSB had an impact on the performance of entering businesses. This is done by replicating the analysis described in Section 6.2 with data from 2007 to 2010 and by redefining the variable $PostPolicy_t$ to equal one for observations from 2009 and 2010. As in Annex I, this pre-trend test is a placebo test because estimation of Equation (4) is based on a sample period that preceded the

introduction of the credit. Evidence that the performance of firms that would have qualified for the credit had it been introduced in 2009 improved, would suggest the existence of pre-trends.

Test results do not find evidence of pre-existing trends in any of the outcome variables used in Section 6.2. As a result, all outcome variables are used in Section 6.2. The next two subsections present the pre-trend test results.

Employment and payrolls

Panel A of Table Annex III.A shows that over the 2007-2010 period, all businesses that started up and would have qualified for the HCSB were 350 per cent smaller in terms of employment than incumbent firms that would not have qualified for the credit. Similarly, for payrolls, entrants were 370 per cent smaller. More importantly, these initial differences did not change over time. For example, the point estimate for employment suggests that the difference decreased by 0.4 percentage points. However, this change was statistically insignificant. Similarly, for payrolls the point estimate suggests that the initial difference could have widened by 9.1 percentage points but this estimate is statistically insignificant as well.

The qualitative conclusions remain unchanged when the sample is limited to only incorporated firms. Panel B of Table Annex III.B show entrants were smaller than incumbents on average over the 2007-2008 period. As well, this table shows that these differences remained unchanged over the latter part of the sample period; the point estimates of α_T are statistically insignificant. As a result, no evidence that pre-trends exist is found.

Table Annex III.A: Difference-in-difference impact estimates for entrants, 2007-2010

	A: All businesses		B: Incorporated businesses	
Dependent variable	Employment (I)	Payroll (II)	Employment (III)	Payroll (IV)
α_T	0.004	-0.091	-0.082	-0.189
	(0.057)	(0.094)	(0.066)	(0.104)
α_E	-3.542**	-3.741**	-2.884**	-3.049**
	(0.043)	(0.074)	(0.044)	(0.075)
Industry-year fixed effects	YES	YES	YES	YES
R^2	0.26	0.26	0.15	0.17
Observations	584,532	584,532	420,429	420,429

Note: This table shows key coefficient estimates for Equation (4). Panel A is based on data from all businesses (i.e. incorporated and unincorporated businesses) while Panel B is based only on incorporated businesses. Industry-year fixed effects are based on 2-digit NAICS industry categories. Benchmark businesses are those that, in a given year, did not qualify for the HCSB. Results are based on Poisson quasi-maximum likelihood estimation. Significance is based on robust standard errors that are shown in parenthesis. **1per cent significance, *5 per cent significance.

Productivity, revenues, investment and R&D expenditures

Table Annex III.B also shows no evidence that pre-trends exist in the data for productivity, revenues, investment, and R&D expenditures. Among, incorporated businesses, entrants were generally much smaller on average than incumbents. This was especially so with respect to revenues and R&D expenditures where entrants are seen respectively to have been about 300 and 260 per cent smaller. More importantly, the table does not show evidence of pre-trends in any of the four variables.

Specifically, estimates of α_T for these variables are statistically insignificant. Consequently, no pre-existing trends in the data are found that might linger to influence the results in Section 6.2.

Table Annex III.B: Difference-in-difference impact estimates for entrants, 2007-2010

Dependent variable	Productivity (I)	Revenues (II)	Investment (III)	R&D (IV)
α_T	0.127	-0.107	0.384	-0.585
	(0.148)	(0.134)	(0.373)	(0.444)
α_E	-0.876**	-2.995**	-1.193**	-2.637**
	(0.054)	(0.120)	(0.155)	(0.407)
Industry-year fixed effects	YES	YES	YES	YES
R^2	0.20	0.18	0.15	0.24
Observations	401,349	419,545	420,429	420,429

Note: This table shows key coefficient estimates for Equation (4). Panel A is based on data from all businesses (i.e. incorporated and unincorporated businesses) while Panel B is based only on incorporated businesses. Industry-year fixed effects are based on 2-digit NAICS industry categories. Benchmark businesses are those that, in a given year, did not qualify for the HCSB. Results are based on Poisson quasi-maximum likelihood estimation. Significance is based on robust standard errors that are shown in parenthesis. **1 per cent significance, *5 per cent significance.

Department of Finance Canada / Ministère des Finances Canada

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Remarks / Remarques:	

SUBJECT / OBJET:
Releasing estimates of the impact of the now defunct Hiring Credit for Small Business measure

File no. / No de dossier	Date
2018FIN468187	

Associate Deputy Minister & G7 Deputy for Canada **Sous-ministre délégué et représentant du Canada au G7**	**(Sign on behalf of DM)** **(Signer au nom du SM)**	☐
Associate Deputy Minister **Sous-ministre déléguée**	**(Sign on behalf of DM)** **(Signer au nom du SM)**	☐
Assistant Deputy Minister **Sous-ministre adjoint(e)**	**(Sign on behalf of DM)** **(Signer au nom du SM)**	☐